

USER MANUAL

SAFEGUARD POWER SOLUTIONS

SIGMAMAX - 6048



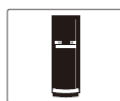
Appliances



PC



TV



Air-conditioning



Fridge



Washing machine

TABLE OF CONTENT

GENERAL PRECAUTIONS	1
PERSONNEL PRECAUTIONS	1
INTRODUCTION	2
FEATURES	2
PRODUCT OVERVIEW	3
LCD PANEL DESCRIPTION	3
BACK PANEL DESCRIPTION	3
INSTALLATION	3
UNPACKING AND INSPECTION	3
MOUNTING THE UNIT	4
DC WIRING INSTRUCTION	5
AC INPUT/OUTPUT CONNECTION	6
AC WIRING	6
AC INPUT CONNECTION	6
AC OUTPUT CONNECTION	7
PV MODULE CONNECTION	7
OPERATION	8
OPERATION KEY INSTRUCTION	8
FAULT MODE	8
SETTING KEY INSTRUCTION	9
SETTING KEY INSTRUCTION CONTINUED	10
LCD DISPLAY	10
LCD DISPLAY CONTINUED	11
OPERATING MODE DESCRIPTION	11
AGS FUNTION	11
AGS FUNCTION DESCRIPTION	11
DRY CONTACT OPERATING VOLTAGE	12
INVERTER FAN	12
UNIT CHARGE FUNCTION	12
UTI/SBU FUNCTION	12
BTS FUNCTION	13
BTS FUNCTION DESCRIPTION	13
COMMUNICATION	13
SOLAR POWER MONITOR DESCRIPTION	13
SOFTWARE INSTALLATION	13
SPECIFICATIONS	14
INVERTER MODE SPECIFICATION	14
AC MODE SPECIFICATIONS	14
AC INPUT VOLTAGE RANGE: ($\pm 5V$)	15
CHARGE MODE SPECIFICATION	15
CHARGE MODE RANGE	15
CHARGE MODE	15
SOLAR CHARGER (MPPT CONTROLLER) ELECTRICAL SPECIFICATION	16
FAULT CODE INFORMATION	17
MPPT CONTROLLER WARNING	18
TECHNICAL SUPPORT	18
REGISTER YOUR PRODUCT	18



WARNING

THIS MANUAL CONTAINS IMPORTANT INSTRUCTIONS FOR ALL INVERTER/CHARGER MODELS THAT SHALL BE FOLLOWED DURING INSTALLATION AND MAINTENANCE OF THE INVERTER.

THE FOLLOWING CASES ARE NOT WITHIN THE SCOPE OF WARRANTY:

WARRANTY EXPIRED.

SERIAL NUMBER WAS CHANGED OR LOST.

INVERTER WAS DAMAGED CAUSED BY TRANSPORTATION, REMISSNESS, OR OTHER EXTERNAL FACTORS.

INVERTER WAS DAMAGED CAUSED BY IRRESISTIBLE NATURAL DISASTERS.

NOT IN ACCORDANCE WITH APPLICABLE LOCAL LAWS OR ELECTRICAL CODES.

GENERAL PRECAUTIONS

- TO REDUCE RISK OF INJURY, CHARGE ONLY LEAD-ACID RECHARGEABLE BATTERIES. IF FLOODED BATTERIES ARE USED, BATTERIES MUST BE MAINTAINED REGULARLY. OTHER BATTERY TYPES MAY CAUSE DAMAGE AND/OR SERIOUS BODILY INJURIES.
- DO NOT EXPOSE TO RAIN, SNOW OR ANY TYPE OF WET LIQUIDS. INVERTERS ARE DESIGNED FOR INDOOR USE ONLY.
- DO NOT ATTEMPT TO DISASSEMBLE IT. REACH OUT TO A QUALIFIED SERVICE CENTER WHEN SERVICE OR REPAIR IS NEEDED.
- TO PREVENT THE RISK OF ELECTRIC SHOCK, DISCONNECT ALL POWER SOURCES AND REMOVE ALL WIRING TO PERFORM ANY MAINTENANCE OR CLEANING. ONLY TURNING OFF THE UNIT WILL NOT REDUCE THE RISK OF INJURY.



WARNING

- PROVIDE VENTILATION FROM THE BATTERY COMPARTMENT TO OUTDOORS. THE BATTERY ENCLOSURE SHOULD BE DESIGNED TO PREVENT ACCUMULATION AND CONCENTRATION OF HYDROGEN GAS AT THE TOP OF THE COMPARTMENT.
- NEVER CHARGE A FROZEN BATTERY AND CONNECT SUCH 12V/24V/48V BATTERIES TO INVERTER.
- INPUT/OUTPUT AC WIRING SHALL BE AT LEAST 12AWG AND RATED FOR UNDER 75°C. BATTERY CABLE SHALL BE RATED FOR LESS THAN 75°C AND SHALL BE NO LESS THAN 4AWG/6AWG GAUGE. REFER TO "DC WIRING SUGGESTION" IN THIS MANUAL FOR THE APPROPRIATE GAUGE FOR DIFFERENT INVERTER MODELS.
- PAY SPECIAL ATTENTION WHEN WORKING WITH METAL TOOLS AROUND BATTERIES. BATTERIES SHORT-CIRCUITING COULD CAUSE AN EXPLOSION.
- READ THE BATTERY INSTALLATION AND MAINTENANCE INSTRUCTIONS CAREFULLY BEFORE OPERATING.






PERSONNEL PRECAUTIONS

- IN CASE BATTERY ACID CONTACTS SKIN, CLOTHING OR EYES, WASH IMMEDIATELY WITH SOAPY WATER.
- AVOID TOUCHING EYES WHILE WORKING NEAR BATTERIES.
- NEVER SMOKE OR ALLOW A SPARK OR FLAME NEAR BATTERIES.

- REMOVE PERSONAL METAL ITEMS SUCH AS RINGS, BRACELETS, NECKLACES, AND WATCHES WHEN WORKING WITH BATTERIES. BATTERIES MAY PROVIDE HEAVY SHORT-CIRCUIT CURRENT, WHICH WOULD BE ENOUGH TO MAKE METAL MELT AND CAUSES SEVERE BURN.
- IF A REMOTE OR AUTOMATIC GENERATOR START SYSTEM IS USED, DISABLE THE AUTOMATIC STARTING CIRCUIT OR DISCONNECT THE GENERATOR TO PREVENT ACCIDENTS DURING SERVICING.



ELECTRICAL SAFETY PRACTICES

	<p>GROUNDING: IN THE EVENT OF A MALFUNCTION OR BREAKDOWN, GROUNDING PROVIDES A PATH OF LEAST RESISTANCE FOR ELECTRIC CURRENT WHICH REDUCES THE RISK OF ELECTRICAL SHOCK.</p> <p>IMPROPER CONNECTION OF THE EQUIPMENT GROUNDING CONDUCTOR CAN RESULT IN A RISK OF ELECTRIC SHOCK. THE CONDUCTOR WITH INSULATION HAVING AN OUTER SURFACE THAT IS GREEN WITH OR WITHOUT YELLOW STRIPES IS THE EQUIPMENT-GROUNDING CONDUCTOR.</p> <p>CHECK WITH A QUALIFIED ELECTRICIAN, OR SERVICE PERSONNEL IF THE GROUNDING INSTRUCTIONS ARE NOT COMPLETELY UNDERSTOOD; OR IF IN DOUBT AS TO WHETHER THE UPS IS PROPERLY GROUNDED.</p> <p>AVOID BODY CONTACT WITH EARTHED OR GROUNDED SURFACES, SUCH AS PIPES, RADIATORS, RANGES, AND REFRIGERATORS. THERE IS AN INCREASED RISK OF ELECTRIC SHOCK IF YOUR BODY IS EARTHED OR GROUNDED.</p> <p>DO NOT REMOVE THE GROUND CONNECTION FROM THE UPS'S POWER PLUG.</p>
	<p>ONLY OPERATE THE INVERTER IN A DRY AND CLEAN ENVIRONMENT. DO NOT EXPOSE THE INVERTER TO RAIN OR WET CONDITIONS. MOISTURE WILL INCREASE THE RISK OF ELECTRIC SHOCK.</p>
	<p> WARNING</p> <p>USE PERSONAL PROTECTIVE EQUIPMENT. SAFETY GLASSES MUST BE WORN AT ALL TIMES BY ALL PERSONS INSTALLING THE INVERTER.</p>
	<p>HAVE YOUR INVERTER SERVICED BY A QUALIFIED REPAIR PERSON USING ONLY IDENTICAL REPLACEMENT PART.</p>

INTRODUCTION

The SigmaMax is a versatile solar charger inverter capable of accepting multiple power sources – AC Grid, Generator, Solar Panels. The SigmaMax – 6048 will be referred to as “Inverter” throughout the manual. This inverter is a 240VAC and 48VDC split system with built-in 80A MPPT solar controller. It is designed to handle multiple appliances. Its auto-sensing function will automatically switch between AC input of 120V/240V. User may also program the output voltage, frequency, charging voltage, charging current. This inverter is capable to supply both 120V/240VAC electronic equipment.

FEATURES

- Pure sine wave output
- Friendly user interface
- Multi-stage (3-step) charging
- MFD (multi-function display)
- Overload and short-circuit protection
- Set charging voltage/charging current
- Battery low voltage shutdown point can be set to 40/42/44V
- Power-save mode
- Set utility/battery priority
- Set utility input wide/narrow range
- Inverter voltage can be set to 100/110/120VAC or 200/220/240VAC
- Inverter frequency can be set to 50/60Hz
- Set utility charging on/off switch
- 80A MPPT charger

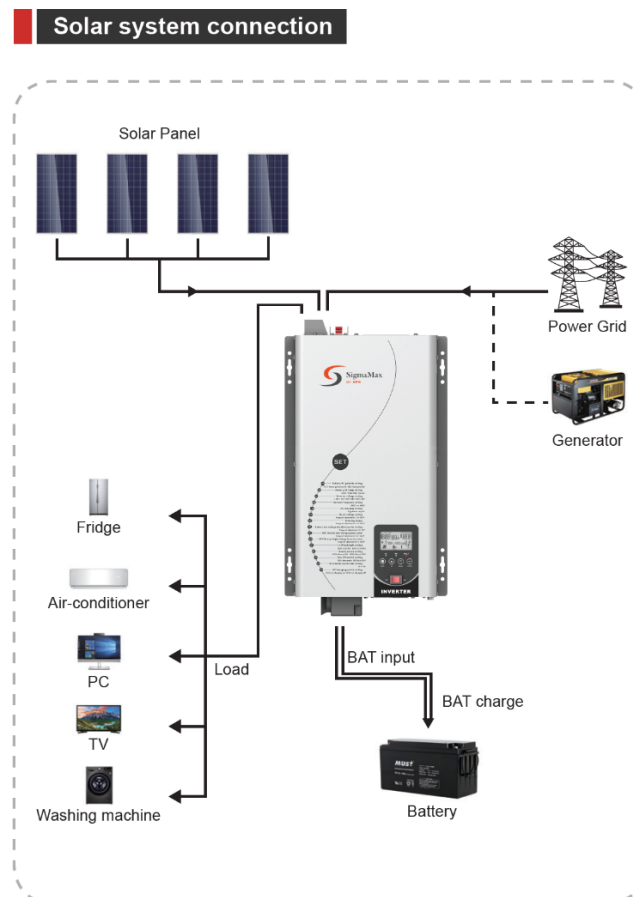
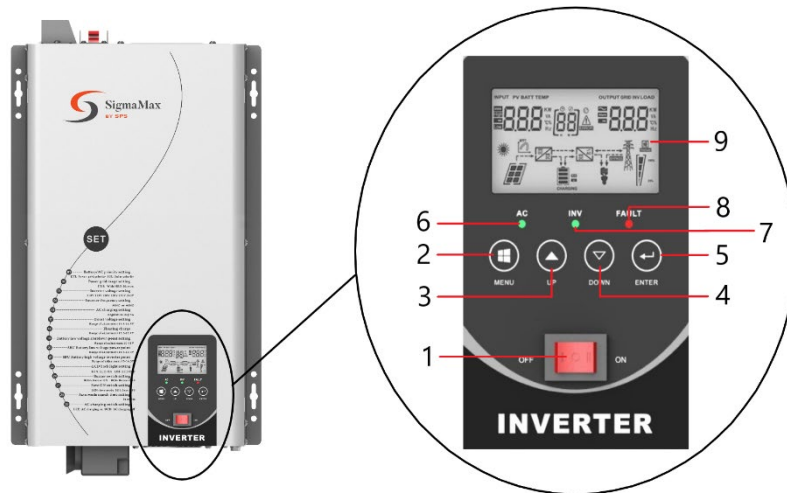


Figure 1 - Connection Overview

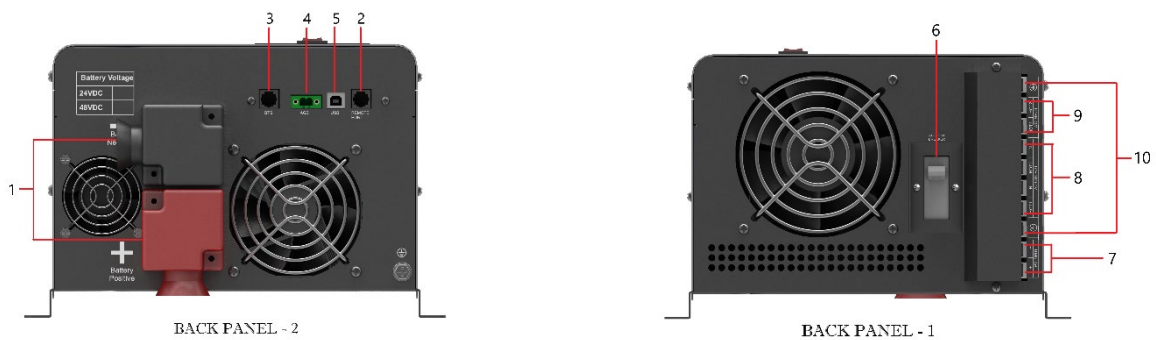
PRODUCT OVERVIEW



LCD PANEL DESCRIPTION

- | | |
|------------------------|------------|
| 1. POWER ON/OFF SWITCH | 6. AC LED |
| 2. MENU | 7. INV LED |
| 3. UP | 8. FAULT |
| 4. DOWN | 9. LCD |
| 5. ENTER | |

BACK PANEL DESCRIPTION



- | | |
|-------------------------|---|
| 1. Battery Terminal +/- | 6. AC Input Protection: Input protect breaker |
| 2. Remote Port | 7. PV Terminal +/- |
| 3. BTS | 8. AC Output: HOT1, 2 – N (100VAC/110VAC/120/VAC) |
| 4. AGS | 9. AC Input: HOT1 – HOT2 (200VAC/220VAC/240VAC) |
| 5. USB | 10. Ground |

INSTALLATION

UNPACKING AND INSPECTION

Before installation, please inspect whole unit. Be sure that nothing inside the package is damaged. You should have received the following items inside of the package.

- User Manual
- Communication Cable

MOUNTING THE UNIT

Consider the following points before selecting where to install:

- Mount on a solid surface.
- Install this inverter at eye level to read the LCD display clearly.
- For proper air circulation to dissipate heat, a minimum clearance of 50 cm to the sides and 80 cm above and below the unit is required.
- The ambient temperature should be between 0°C and 40°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.



SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACES ONLY.

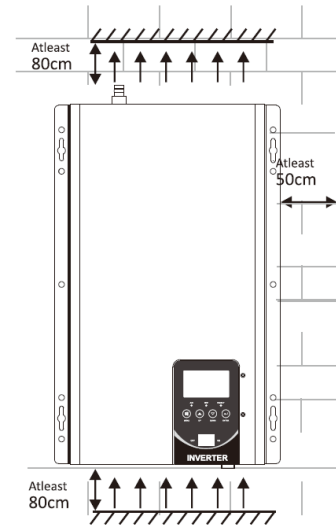


Figure 2 - Mounting clearance requirement

WARNING: DUE TO THE WEIGHT OF THE UNIT (40KG OR 88LBS), IT IS STRONG RECOMMENDED THAT THE FOLLOWING PROCEDURE GETS CARRIED OUT BY 2 PERSONS TO AVOID POSSIBLE DROP INJURIES. MAKE SURE TO CLEAR THE SURROUNDING AREA TO BE FREE OF OBSTACLES BEFORE ATTEMPTING TO HANG THE UNIT.

Note: Mounting screws are not supplied with the unit due to varies mounting environments.

Following these steps to mount the inverter:

1. Mark the desired location to be installed.
2. If mounting surface is concrete, brick, or other masonry material, go to step 5.
3. If mount surface is drywall:
4. Using a stud finder, mark the center of two adjacent studs behind the wall. Mark the desired height. Install two horizontal wooden support beams across these two studs, one for the upper mounting holes and one for the lower mounting holes. It is recommended that the wooden support to be at least 1½ inch thick.
5. Drywall anchors can be used to install the inverter. Make sure the anchor is rated for more than the weight of the unit.
6. Mark the location of the first hole.
7. With a leveler, mark the second hole. Ensure both screws are lined up properly. The distance between left and right mounting holes on the inverter is 239mm (10.5 inches), see diagram below.
8. Drill through the marked holes and install wooden screws. Wooden screws must penetrate at least 1 inch into the support beam. Make sure not to screw in all the way yet, leave about ½" gap to hang the inverter.
9. With the help of a second person, lift the inverter and hang it onto the screws. Double check to ensure both screws are mounted properly.
10. With a level, check to make sure inverter is as level as possible. Adjust if necessary and tighten both upper screws.
11. Install the lower mounting screws and tighten.

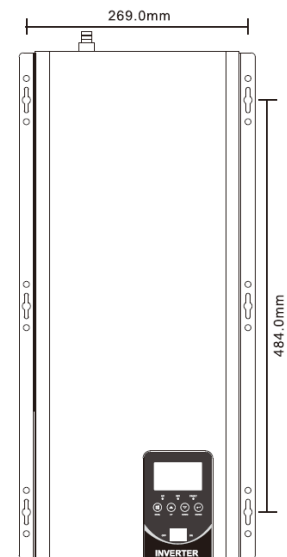


Figure 3 - Clearance Requirement

DC WIRING INSTRUCTION

It is suggested to keep battery banks as close as possible to the inverter. Battery cable length of 1m (3 ft) is suggested. Please find the following minimum wire sizes. If DC cable is longer than 1 m, please use thicker battery cables to bear power current going through.

Model	Battery Voltage Type	Wire Gauge
SigmaMax – 6048	48VDC	3 AWG

Please connect cable with minimum thickness above or combine several thinner cables to achieve the same gauge rating. Battery banks should be kept close to the inverter. For the most optimum inverter performance, always use shorter and higher gauge cables.

Please follow battery connection steps below:

1. Assemble battery ring terminal.
2. Connect all battery packs as units requires. Note: This model requires 48VDC, therefore four (4) 12V batteries connected in series are required. To wire batteries in series, review the diagram below.
3. Though not required, but it's suggested to connect at least 200Ah for this inverter.
4. Note: PLEASE ONLY USE SEALED LEAD ACID BATTERY OR SEALED GEL/AGM LEAD-ACID BATTERY. Insert the ring terminal of the battery cable into inverter's battery connector, make sure the bolts are tightened with torque of 2-3Nm. PAY SPECIAL ATTENTION TO THE POLARITY OF THE BATTERY BACK TO THE INVERTER, POSITIVE TO POSITIVE, NEGATIVE TO NEGATIVE. Ensure ring terminals are tightly screwed to the battery terminals.

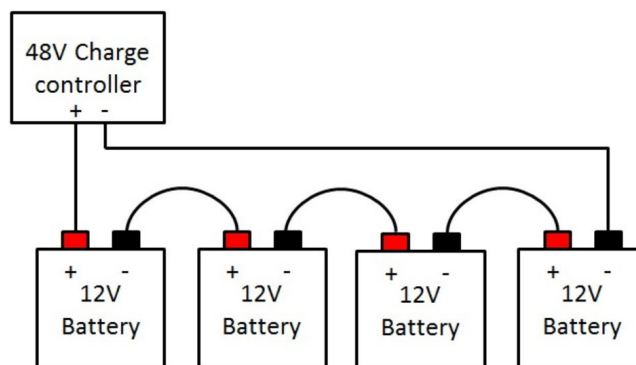




Figure 4 - Connecting batteries in series



Figure 5 – Inverter battery terminal

	WARNING: Shock Hazard Installation must be performed with care due to high battery voltage in series.
	CAUTION!! Do not place anything between the flat part of the inverter terminal and the ring terminal. Otherwise, overheating may occur. CAUTION!! Do not apply antioxidant substance on the terminals before terminals are connected tightly. CAUTION!! Before making the final DC connection or closing DC breaker/ disconnect, be sure positive(+) must be connected to positive(+) and negative(-) must be connected to negative(-).

AC INPUT/OUTPUT CONNECTION

CAUTION!! Before connecting to AC input power source, please install a separate AC breaker between inverter and AC input power source. This will ensure inverter can be disconnected safely during maintenance and fully protected from over current of AC input.

Suggested AC breaker: 80A for 6KW.

CAUTION!! Do NOT connect the output wiring to “Grid” terminal or connect the grid wiring to the “Load” terminal.

WARNING! All wiring must be performed by a qualified electrician.

WARNING! It's very important to use appropriate cable for Grid connection for system safety and efficient operation. To reduce risk of injury, please use the proper cable size below.

AC WIRING

It is recommended to use the following wire gauge for AC connection:

Model	Gauge	Torque Value
SigmaMax - 6048	10 AWG	1.4-1.6Nm

Please follow steps below to implement Load/Grid connection:

- Before Load/Grid connection, be sure to open DC protector first.
- Remove insulation sleeve from wires.
- Connect Ground (PE or G) wire first by inserting the wire into the terminal as indicated on the inverter and tighten.
- Insert grid wires Hot and Neutral into inverter's terminal block according to polarities as indicated at connection point. Tighten terminal screws.
- Ensure that no more than ¼” of bare wire is exposed. If the wire is too long, remove the wire, shorten it, and reinsert until proper length is reached.

AC INPUT CONNECTION

- Ground (Bare)
- HOT1 (Black or red)
- HOT2 (Black or red)

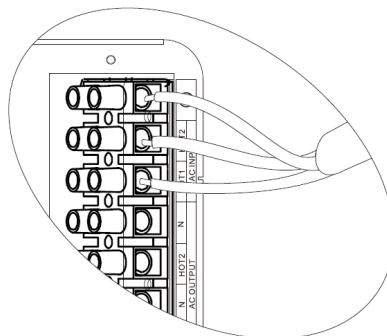



Figure 6 - AC Input Terminals

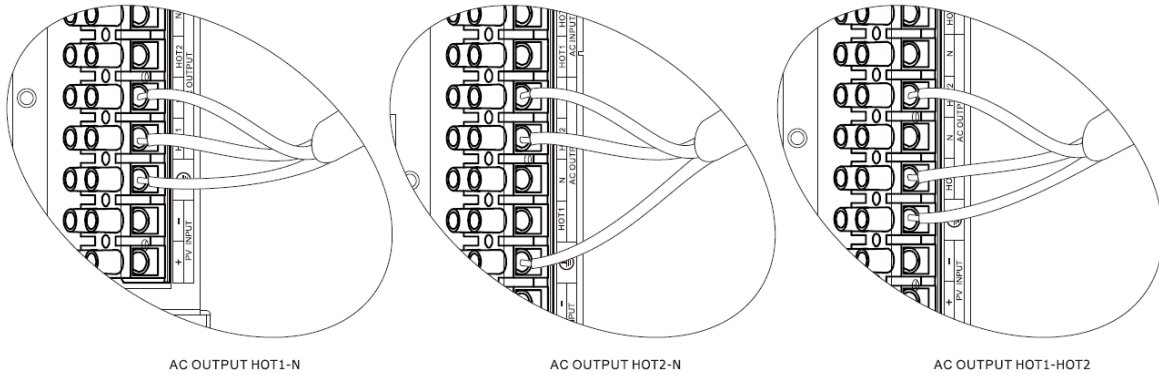
	WARNING: Be sure that AC power source is disconnected before hard-wire it to the unit.
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- Now, insert Load wires according to polarities indicated on the terminal block and tighten terminal screws. Be sure to always connect the Ground wire first.

AC OUTPUT CONNECTION

- Ground (Bare)
- HOT1 (Black or red)
- Neutral (Blue or white)
- HOT2 (Black or red)

Figure 7 - AC Output Terminals



- Make sure the wires are securely connected

CAUTION: Appliances such as air conditioner are required at least 2-3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it's equipped with time-delay function before installation. Otherwise, this inverter will be triggered overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

PV MODULE CONNECTION

Please follow steps below to implement PV module connections:

1. Remove insulation sleeves for positive and negative wires.
2. Connect positive pole (+) of connection wire to positive pole (+) of PV input connector. Connect negative pole (-) of connection wire to negative pole (-) of PV input connector.
3. Make sure the wires are securely fastened.

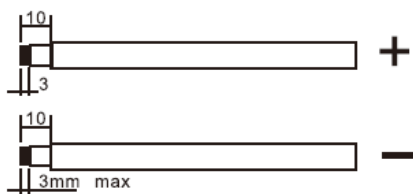


Figure 8 - Wire Sleeves

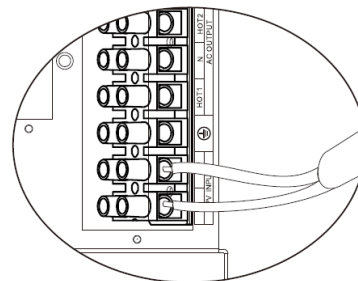
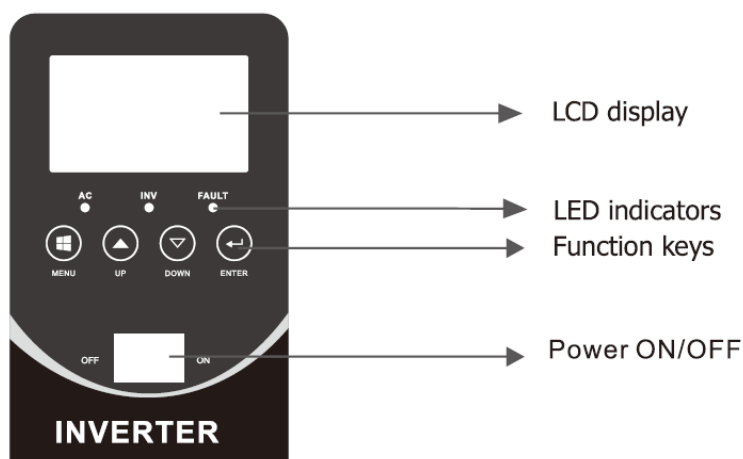


Figure 9 - PV Connection Terminal

OPERATION



OPERATION KEY INSTRUCTION

- Toggle Power button on/off to turn machine On and Off.
- There are four buttons: MENU, UP, DOWN, ENTER
- Short press UP and DOWN to check the various display parameters.
- Long press MENU to enter the setting menu page. MENU and ENTER will go to the next page in setting, UP and DOWN to set parameters. After desired selection, long press ENTER for 2s to save setting and exit the menu.

FAULT MODE

LED instruction

LED	LED state	information
LED AC(green)	Off	No AC input
	On	AC normal
	Blink	AC over range
LED Inv(yellow)	Off	
	On	Inverter mode
LED Fault(red)	Off	normal
	On	fault
	Blink	caution

BUZZER instruction

Buzzer state	information
Buzzer off	normal
Buzzer beep	caution
Buzzer on	fault

SETTING KEY INSTRUCTION

MENU	Function key	Function description	
01	Battery/AC priority setting	Utility priority(default) [0] UTI	If choice UTI, the inverter work in AC model until AC cut off or over the AC range.
		Battery priority [0] SBU	The inverter work in AC model if battery less 20set value. The inverter work in DC model if battery more than 21set value continue 1min.
02	Utility power range setting	vdE: Wide(default) [02] v d E	If set Wide, the AC range 140-270V.
		NRU: Narrow [02] N R U	If set NRU, the AC range 180-270V.
03	120V Mode Inverter voltage setting	110V(default) [03] 110 _v	110/115/120V
	220V Mode Inverter voltage setting	220V(default) [03] 220 _v	220/230/240V
04	Inverter frequency setting	60HZ [04] 600 _{Hz}	50HZ(default) [04] 500 _{Hz}
13	AC charging setting	Rated current(default) [13] 40 _A	Range of adjustment: 10A - Max Regulation step 5A
17	Boost voltage setting	14.1V(default) [17] 14.1 _v	Range of adjustment 13.8-14.5V
18	Floating charging setting	13.5V(default) [18] 13.5 _v	Range of adjustment 13.5-13.7V
19	Battery low voltage shutdown point setting	10.5V(default) [19] 10.5 _v	Range of adjustment 10-11V
20	SBU Battery low voltage power point	11.5V(default) [20] 11.5 _v	Range of adjustment 10.5-12.0V If you choice SBU, when the battery voltage less than value, the inverter will work in AC model
21	SBU Battery high voltage inverter point	13.5V(default) [21] 13.5 _v	Range of adjustment 13V-14.0V If you choice SBU, when the battery voltage more than value continue 1min, the inverter will work in DC model.

SETTING KEY INSTRUCTION CONTINUED

23	LCD back light settings	LCD ON [23] LON	The LCD back light on.
		LCD OFF(default) [23] LOF	Press any button to light up continue 1min.
24	Buzzer switch settings	Buzzer ON(default) [24] BON	Buzzer OFF [24] BOF
		SEN [27] SEN	Save mode enable inverter is set to detect the load every 5/30 seconds
27	Save mode switch settings	Sdi(default) [27] Sdi	Save off The save model disenable.
		5s(default) [28] 5	5s inverter is set to detect the load every 5 seconds. 30s inverter is set to detect the load every 30 seconds.
28	Search time settings in Save mode		
29	AC charging switch settings	AC charging on(default) [29] UCE	AC charging off [29] UCd
		14.2V(default) [30] 14.2 ^v	
30	MPPT controller Absorption voltage set		
31	MPPT controller float voltage set	13.5V(default) [31] 13.5 ^v	
UP	Page up key		
DOWN	Page down key		
ENTER	Confirm the exit key		


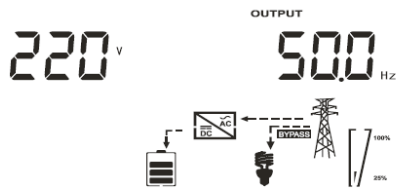
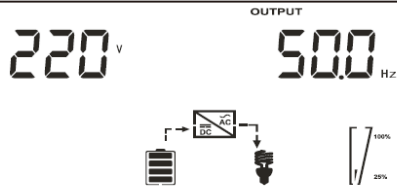
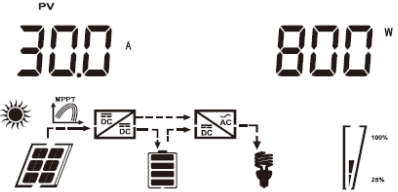
LCD DISPLAY

Selectable information	LCD display	
Software material No. / Version No.	357	00
Battery voltage / Rated power	BATT 24	LOAD 3.0 ^{KW}
Output Voltage / Output Frequency	220 ^v	OUTPUT 50.0 ^{Hz}
Input Voltage / Input Frequency	INPUT 220 ^v	50.0 ^{Hz}

LCD DISPLAY CONTINUED

Battery Voltage / Current	BATT 26.0 ^v 4 ^A
Load Power / Percentage	30 ^W LOAD 1 [%]
Battery / Inverter Temperature	BATT TEMP INV 0 ^{°C} 48 ^{°C}
Solar charge current/power	PV 30.0 ^A 800 ^W

OPERATING MODE DESCRIPTION

Operation mode	Description	LCD display
Fault mode	If any fault has happened, the machine will enter to the mode. And fault code is displayed on the LCD.	
Line mode	Input power will provide energy to load directly. And it will charge the battery at the same time. If voltage of input power is outside of section, the machine will switch to battery mode.	
Battery mode	The unit will get energy from battery and provide to load.	
PV mode	The unit will get energy from solar and provide to load.	

AGS FUNTION

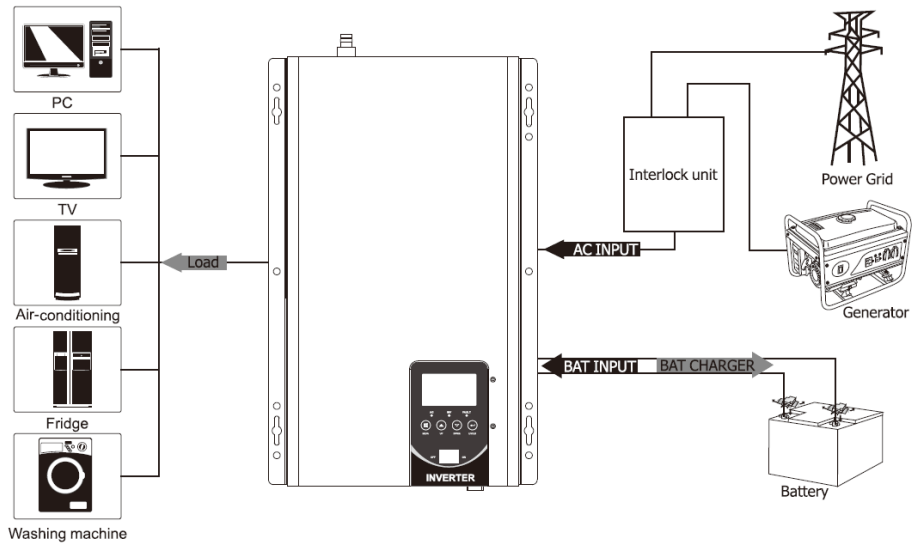
AGS FUNCTION DESCRIPTION

The inverter is capable to start a generator automatically via a dry contact when the battery is at low voltage.

NOTE: The generator must have dry contact function.

If both AC grid and Generator are connected to the inverter input at the same time, an interlock device shall be installed between generator output and inverter input. This will ensure the AC grid and generator will not provide power to the inverter at the same time. This is not necessary if only the AC Grid or only the generator is connected.

Figure 10 - Interlock unit



DRY CONTACT OPERATING VOLTAGE

Set Low Shutdown Voltage	Operation Voltage	Restoring Voltage
40V	42V	54V
42V	44V	54V
44V	46V	54V

INVERTER FAN

SigmaMax – 6048	Full speed
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UNIT CHARGE FUNCTION

Inverter & MPPT controller: When solar energy is not enough, inverter will charge remaining current.

Inverter set charge current	Solar charge current	Inverter charge current
80A	0A	80A
	20A	60A
	>80A	0A

UTI/SBU FUNCTION

Set	Convert condition	Convert stage specification
UTI	until AC cut off or over the AC range	AC model to DC model
SBU	DC < 20 set page parameter	DC model to AC model
	PV > 15V _(12V) & DC > 21 set page parameter and 1min	AC model to DC model

BTS FUNCTION

BTS FUNCTION DESCRIPTION

- The inverter collects the battery temperature through the BTS port, based on 25°C with each rise of 1°C, the charging voltage drops by 18mV/1 at the set charging voltage (up to 60°C).
- BTS down charge voltage is based on drops of boost voltage and float voltage.
- Using an optional battery temperature cable to connect the inverter and battery (not supplied with package).

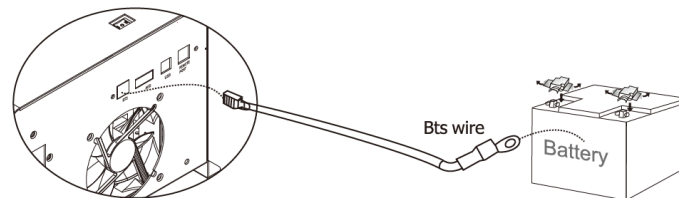


Figure 11 - BTS Connection

COMMUNICATION

SOLAR POWER MONITOR DESCRIPTION

This software supports the communication function for various product. The software will search the COM Port and inverter model automatically.

SOFTWARE INSTALLATION

The operation steps are as followed:

1. Download the SolarPowerMonitor software at www.safeguardpowersolutions.com/support
2. Connect the inverter with a communication cable to the computer's USB port.

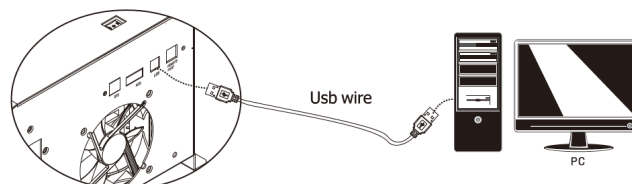
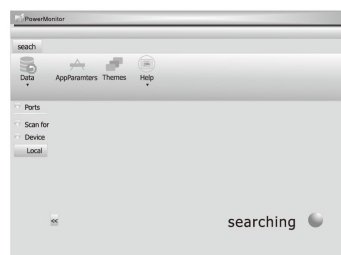
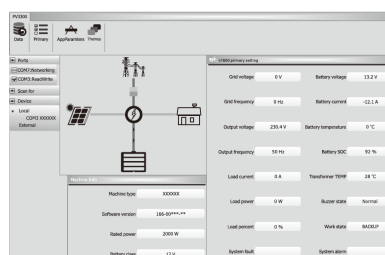


Figure 12 - Communication Port

3. Open the PowerMonitor software and turn on the inverter.
4. The SolarPowerMonitor will automatically scan communication ports.



5. After a short moment...



SPECIFICATIONS

INVERTER MODE SPECIFICATION

Model	SigmaMax – 6048
Rated power (W)	6KW
Power factor	1
Wave form	Pure sine wave
Output voltage RMS	100V/110V/120VAC (200V/220V/240V) ± 10%
Output frequency	50Hz or 60Hz (±0.3Hz)
Inverter efficiency (peak)	>80%
Overload	100%<Load<110% (alarm 5 min then stop output and fault code 07) 110%<Load<125% (alarm 60s then stop output and fault code 07) Load>125% (alarm 10s then stop output and fault code 07)
Surge rating	15000VA
Capable of starting electric motor	3P
Battery voltage	48VDC
Minimum start voltage	44VDC
Low battery cutoff	(low voltage fault code04) 40/42/44V
Low battery alarm	Add 0.5V/battery: (low battery alarm one second one time) (40/42/44V) + 2VDC
High voltage alarm	Add +1V/battery: (high voltage one second one time/after 30s fault 03) (55.2-58) + 4V
Save mode	Load ≤ 40W (110V) Load ≤ 80W (220V)

AC MODE SPECIFICATIONS

AC parameter

Input waveform	Pure sine wave
Nominal input voltage	200Vac / 220Vac / 240Vac
Max input voltage	270Vac MAX
Input frequency	50HZ/60HZ (auto sensing)
Output waveform	Same as input waveform
Overload protection	Breaker + software protection
Output short circuit	Breaker+ software protection
Efficiency(AC mode)	>95%® load, full battery)
Transfer time AC TO DC	15ms(Typical)
Transfer time DC TO AC	15ms(Typical)

AC INPUT VOLTAGE RANGE: ($\pm 5V$)

model	range	Low cutoff	Low recover	High cutoff	High recover
220V	narrow	AC<180V	AC>190V	AC>270V	AC<265V
		F<40HZ	F>45HZ	F>70HZ	F<65HZ
	wide	AC<140V	AC>150V	AC>270V	AC<265V
		F<40HZ	F>45HZ	F>70HZ	F<65HZ

CHARGE MODE SPECIFICATION

Max charge current: ($\pm 5A$)

Model	SigmaMax - 6048
48V	40A
Min Charge current 10A. Change by every 5A.	

CHARGE MODE RANGE

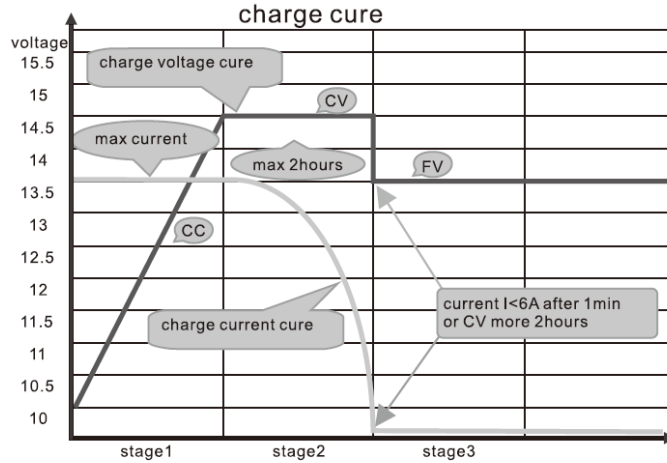
Setting	Low voltage	Charge mode	recover	Charge mode
220V AC wide range	AC>265V	Stop charge	AC<260V	Charge recover
	AC<155V	Stop charge	AC>160V	Charge recover
	40<F<70HZ charge			

CHARGE MODE

Charge current adjustable	Charge current adjustable: 10A~max (adjust by every 5A)
Battery voltage	40-58 VDC
Short circuit protection	Breaker
Over charge protection	Bat V \geq charge voltage+1V/battery, 1s 1 time for 30s then alarm 03
Rule	Boost CC → Boost CV → Boost FV

Charge Stage Transition Definition

- ◆ **Boost CC Stage:** If A/C input is applied, the charger will run at full current in CC mode until the charger reaches the boost voltage.
- ◆ **Boost CV Stage:** the charger will keep the boost voltage in Boost CV mode until the charge current less 6A continue 1minute or keep the boost voltage time more than 2hours . Then drop the voltage down to the float voltage.
- ◆ **Float Stage:** In float mode, the voltage will stay at the float voltage.
- ◆ If the A/C is reconnected , the charger will reset the cycle above.



SOLAR CHARGER (MPPT CONTROLLER) ELECTRICAL SPECIFICATION

Type	MPPT-80A
Nominal system voltage	12/24/48V (auto detection);
Maximum charge current	80A±4A
Battery voltage	48V
Maximum solar input voltage	145±2V
PV array MPPT voltage range	60-130V
Maximum input power	5000W
Charging stages	Bulk, Absorption, Float
Over charging voltage	60.0V
Over charging comeback voltage	59.0V
Battery defect voltage	34.0V
Charging curve	<p>The graph shows Battery Voltage, per cell (left y-axis) and Charging Current, % (right y-axis) over Time (x-axis). It is divided into three stages: Bulk (Constant Current), Absorption (Constant Voltage), and Maintenance (Floating). Time markers T0 and T1 are shown. The current drops to 0% at the end of the Absorption stage.</p>

FAULT CODE INFORMATION

When inverter alarms, it must be restarted to clear fault.

Fault code	Fault	Fault instruction	What to do
[01]▲	Fan fault	Fan stop run	Check the fan.
[02]▲	Over temperature	BTS over temperature: $T_{battery} > 65^{\circ}\text{C}$ 1s 1 time for 1min then fault alarm 02; $T_{battery} < 60^{\circ}\text{C}$ recovery Inverter over temperature: $T_{inv} > 90^{\circ}\text{C}$ 1s 1 time for 1min then fault alarm 02; $T_{inv} < 85^{\circ}\text{C}$ recovery	Power off and waiting for minute
[03]▲	DC voltage too high	Battery over voltage: $\text{DC} > V_{(\text{charge voltage}+1\text{V})/12\text{V}}$ alarm for 30s then fault code 03 Over voltage recovery: $\text{DC} < V_{(\text{charge voltage}+1\text{V})-0.2\text{V}/12\text{V}}$	Check the battery specifications
[04]▲	DC voltage too low	Low voltage alarm: $\text{DC} < V_{(\text{cutoff}+0.5\text{V})/12\text{V}}$ Alarm recovery: $\text{DC} > V_{(\text{cutoff}+0.5)+0.2/12\text{V}}$ Low voltage fault: $\text{DC} < V_{\text{cutoff}}$ fault code 04	Check the battery specifications
[05]▲	Output short circuit in DC model	Output short circuit: short circuit test fault 05	Remove your load and restart
[06]▲	Output over voltage	Output over voltage: $V_{\text{output}} > 135\text{V}/270\text{V}$ 500ms fault 06	Return to repair center
[07]▲	Output over load	overload: $100\% < \text{Load} < 110\%$ alarm per every second (5min later inverter cutoff output and fault 07) $110\% < \text{Load} < 125\%$ alarm per every second (60s later inverter cutoff output and fault 07) $\text{Load} > 125\%$ alarm per every second (10s later cut off output and fault 07)	Decrease your load
[51]▲	Output over current	Inverter Output over current: 1-3K: $I_{\text{rms}} > 40\text{A}$. 4-6K: $I_{\text{rms}} > 80\text{A}$ 200ms fault 51	Check if wiring is connected well and remove abnormal load.
[58]▲	Output low voltage in DC model	Output low voltage: $V_{\text{output}} < 85\text{V}/170\text{V}$ 500ms fault 58	Decrease your load

MPPT CONTROLLER WARNING

Warn code	Warn information	Warn information specification	What to do
[E0]▲	Hard ware protection		Return to repair center
[E1]▲	Over current		
[E2]▲	Current sensor error		
[E3]▲	MPPT controller over temperature		Stop PV charge soon
[E4]▲	PV voltage too high		Check PV
[E5]▲	PV voltage too low		
[E6]▲	Battery voltage too high		Check battery
[E7]▲	Battery voltage too low		
[E8]▲	Current is uncontrolable		Return to repair center
[E9]▲	Parameter error		
[E1]▲	MPPT controller fan		Check MPPT fan

TECHNICAL SUPPORT

SafeGuard Power Solutions, LLC.

Email: support@sps-us.net

Phone: 855.484.6797 (M-F, 9-5 pst)

REGISTER YOUR PRODUCT

Go to: <https://safeguardpowersolutions.com/register-your-product/>

DATE OF PURCHASE: _____

POINT OF SALE: _____

ORDER NUMBER: _____

MODEL: _____

SERIAL NUMBER: _____

INSTALLER: _____